

STATE OF COLORADO

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Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department
of Public Health
and Environment

January 19, 2012

James Bell
Executive Vice President
Bio-Microbics, Inc.
8450 Cole Parkway
Shawnee, KS 66227

Subject: Acceptance of the Bio-Microbics FAST® Technology as a New Technology for Use in Domestic
Wastewater Treatment Works in Colorado

Dear Mr. Bell:

The Water Quality Control Division (the Division) has received and reviewed information for the Bio-Microbics, Inc. FAST® Technology in accordance with Section 1.6.1 of *Design Criteria Considered in the Review of Wastewater Treatment Facilities Policy 96-1* (Wastewater Design Criteria). The Bio-Microbics FAST® Technology design is accepted for use as a New Technology subject to the design criteria in Tables 1 and 2. This acceptance is not intended as a third-party certification of the technology.

This acceptance addresses the following item:

- Bio-Microbics FAST® Technology System.

This acceptance applies only to the Bio-Microbics FAST® Technology using MicroFAST®, NitrifAST®, and ABC-N® systems as described below and does not constitute construction approval for installation in domestic wastewater treatment facilities. **Review and approval for the design of any domestic wastewater facility proposing to use this technology will be further reviewed on a site-specific basis by the Division** as required by Section 22.11(1) of the *Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works 5CCR 1002-22* (Regulation 22) and the Colorado Water Quality Control Act (Act), Section 25-8-702, C.R.S. which states in part that: *"No person shall commence the construction of any domestic wastewater treatment works or the enlargement of the capacity of an existing domestic wastewater treatment works, unless the site location and the design for the construction or expansion have been approved by the division."*

Any modifications to the physical attributes or characteristics of this treatment technology must be submitted to this office for review and acceptance by the Division prior to sale in Colorado. This condition includes changes made to the manufactured model (e.g., media, piping, mechanisms). The Division will review any additional third party verification reports and issue a revised acceptance letter, or denial, as appropriate.

Table 1. Bio-Microbics FAST® Technology Design Criteria:

Design Criteria
<ol style="list-style-type: none"> 1. Approved facility design capacity shall be based on the maximum monthly average flow and loading. Unit process sizing shall be established in accordance with the hydraulic loading rate limits indicated in Table 2 and proprietary organic and nitrogen loading limits agreed upon with Bio-Microbics, Inc. during this technology acceptance review. 2. Primary settling compartment or tank with fine screen ($\leq 3/8$-inch screen spacing) must precede the treatment unit compartment or tank to remove scum, grit, and floating debris. The primary settling compartment or tank must provide at least 12-hours hydraulic residence time (HRT) at the maximum monthly average flow capacity. If a recycle stream returns flow/solids to the primary chamber or other upstream point such as an equalization basin, the minimum HRT shall be 12-hours at the maximum monthly average flow including additional design recycle flows. 3. Pretreatment for non-residential kitchens must include a separate grease separator tank prior to the primary septic tank(s), providing a minimum HRT of 4 days based on the kitchen's design maximum daily flow. 4. If multiple trains are included in parallel, adequate flow splitting devices must be provided to control the maximum design flow to each unit. 5. Treatment Credit. The domestic wastewater treatment plant must meet appropriate effluent discharge limits (e.g., Preliminary Effluent Limits or PELs, permit effluent limits, regulatory standards). A facility with the treatment technology designed in accordance with the loading rates agreed upon with Bio-Microbics, Inc. during the technology acceptance review and these criteria is anticipated to provide treatment for BOD, TSS, and total inorganic nitrogen. For an ammonia effluent limit less than or equal to 5 mg/L, a NitriFAST® must be included. For a total inorganic nitrogen effluent limit at end of pipe less than or equal to 10 mg/L, full nitrification (e.g., using NitriFAST® if needed) and an ABC-N® must be included. No phosphorus removal credit is granted for the MicroFAST®, NitriFAST®, and ABC-N® treatment units. 6. Aeration and Pump Equipment. Aeration equipment for MicroFAST® and NitriFAST® units and the recirculation pumps for ABC-N® units shall be provided. The design must demonstrate adequate blower size, ABC-N® pump size, and capacity based on site-specific conditions and treatment requirements including, but not limited to, elevation, temperature (e.g., seasonal, air, wastewater), pipe sizes, bends, etc. (e.g., developed in consultation with Bio-Microbics, Inc.). 7. Alkalinity. Nitrification requires alkalinity, at least 7.14 pounds as CaCO₃ per pound ammonia oxidized. The wastewater must be shown to have sufficient alkalinity (i.e., minimum of 50 mg/L CaCO₃ in excess of stoichiometric requirement) or chemical treatment must be included to provide adequate alkalinity. 8. Carbon Source for Denitrification. The designer must ensure that a sufficient amount of organic carbon (soluble COD) is present in the influent wastewater to denitrify the nitrates such that the effluent total nitrogen concentration is in compliance with the discharge limitations. The design must provide supporting documentation/calculations demonstrating the sufficient amounts of available carbon for this process. If calculations show that adequate soluble COD is not available in influent wastewater, provisions must be included for a supplemental carbon source to be fed directly to the anoxic reactor. Supplemental carbon feed must be provided for an ABC-N®. The design must demonstrate TKN loading, carbon feed rates/ratios, temperature, reaction kinetics based on the type of supplemental chemical, process controls, and downstream organic polishing (e.g., installation of a MicroFAST® unit following the ABC-N® unit when supplemental carbon is not flow paced). 9. A solids separation device (e.g., effluent screen) is required following the final BioMicrobics unit and before disinfection and discharge (e.g., a tank following the last treatment stage for settling and an effluent

filter device such as the Bio-Microbics SaniTEE® effluent filter, a pump tank with settling and a screening device around the pump or pumps such as Bio-Microbics BioSTEP® effluent filter).

10. If recycle is proposed, the design must indicate from where, to where, and how recycle flow is directed and managed (e.g., as developed in consultation with Bio-Microbics, Inc.). Use of recycle does not change credits agreed upon with Bio-Microbics, Inc. during this technology acceptance review.
11. Temperature adjustments. Design values are based on a wastewater temperature of 20 °C. Treatment rates (e.g., nitrification, denitrification) shall be adjusted for anticipated wastewater temperatures below 20 °C in accordance with manufacturer agreed factors. For example, at temperatures less than 20 °C, TKN loading credit is reduced (e.g., 20%-40%), effectively increasing the treatment media and associated detention time that must be provided, based on the EPA Nitrogen Control Manual (EPA/625/R-93/010, September 1993).
12. Site pretreatment processes shall be incorporated into the process train, as required, to ensure that anticipated peak loads (e.g., hydraulic, organic, nutrient) are accommodated and mitigated to maintain treatment performance. The treatment technology is intended for domestic wastewater without industrial sources.
13. For facilities where ambient temperatures can be below freezing, the design shall include adequate cold weather provisions such as heat trace lines, and/or installation in a temperature-controlled enclosure for above ground wet components.
14. Alarm. A blower malfunction alarm must be provided. The design must identify how the alarm signal will notify operators of alarm activations, when the facility is attended and unattended.
15. Design Redundancy. Installations shall have at least one spare blower (e.g., MicroFAST®, NitriFAST®) and spare pump (e.g., ABC-N®) either installed or available at the site.
16. Other Processes Required. Although the treatment technology has major unit process components of a treatment plant, it does not constitute a complete package treatment plant and the particular site-specific design must include other unit processes (e.g., influent and effluent flow metering, chemical addition, disinfection, phosphorus removal) to be a fully functioning wastewater treatment plant and meet effluent discharge limits and associated discharge permit requirements. These other supporting unit processes will be evaluated during the site location and design reviews.
17. Tank Design. Design must include adequate provisions to protect against tank buoyancy. Tanks holding BioMicrobics inserts must be sized in accordance with manufacturer minimum specifications (Table 2). Tanks must be installed below grade or insulated appropriately to maintain temperature and prevent freezing.
18. Maintenance Access. Design shall include provisions that allow the operator to access, operate, and maintain all equipment without entering a confined space or requiring heavy equipment to lift a concrete lid if possible.
19. Manufacturer Review. A review letter issued by the manufacturer indicating the installation was designed in accordance with manufacturer recommendations must be included with the site-specific design submittal. The manufacturer's review may not supersede the criteria in this acceptance or be substituted for all required engineering documentation and calculations stamped and signed by a Colorado licensed Professional Engineer.

Additional Operations and Maintenance Criteria

1. Design must include discussion of residuals management considerations, including the expected solids generation quantities and quality, and a discussion of the method of final sludge disposal, if applicable.
2. Design shall include provision for operator training including, but not limited to: start-up operations,

normal operations, hydraulic fluctuations, temperature impacts, sludge monitoring, removal, and residual management.

3. An Operations and Maintenance (O&M) Manual shall be provided for all installations. The document should be available for review by the Division during compliance inspections.
4. Individual operations plans shall include scheduled inspections, assessments, and maintenance of the grease tank, solids accumulation in the treatment tanks, primary tank effluent filter(s), and biofilm growth media condition as an operational safeguard. This plan for scheduled inspections and assessments should include a routine inspection at least annually. Inspection and maintenance (e.g., grease removal, solids and scum removal, filter cleaning) frequency may change with time as media condition changes and performance experience is gained.
5. Certified Operator. The domestic wastewater treatment works with this technology will be required to be under the control of an operator with a Class C or Class B Domestic Wastewater Treatment Facility Certification, depending upon the system complexity and sensitivity of the receiving water, in accordance with Regulation 100 Water and Wastewater Facility Operators Certification Requirements.

Table 2. BioMicrobics FAST® Unit Sizing Criteria¹:

Model	Maximum Design Flow (Maximum Monthly Average Flow)	Air Blower Size² (Below 5,000 ft) [ABC-N = pump]	Minimum Tank Size
MicroFAST 3.0	3,000 gpd	44-85 cfm	2,250 Gallons (8,517 L)
MicroFAST 4.5	4,500 gpd	90-140 cfm	4,219 Gallons (15,971 L)
MicroFAST 9.0	9,000 gpd	155-200 cfm	8,438 Gallons (31,941 L)
NitriFAST 3.0	3,000 gpd	44-85 cfm	2,250 Gallons (8,517 L)
NitriFAST 4.5	4,500 gpd	90-140 cfm	4,219 Gallons (15,971 L)
NitriFAST 9.0	9,000 gpd	155-200 cfm	8,438 Gallons (31,941 L)
ABC-N 3.0	3,000 gpd	60-90 gpm	2,250 Gallons (8,517 L)
ABC-N 4.5	4,500 gpd	90-120 gpm	4,219 Gallons (15,971 L)
ABC-N 9.0	9,000 gpd	150-180 gpm	8,438 Gallons (31,941 L)

NOTES:

1. Unit process sizing shall also be established in accordance with organic and nitrogen loading limits agreed upon with Bio-Microbics, Inc. during this technology acceptance review in accordance with condition #4 above.
2. Blower and pump size indicates minimum values. The design must demonstrate adequate blower size, ABC-N pump size, and capacity in accordance with condition #6 above.

The owner of the domestic wastewater treatment works is responsible for proper design, operation, and maintenance of the facility to meet permit effluent requirements.

Please be aware that any point source discharges of water from treatment facilities are potentially subject to a discharge permit under Colorado's State Discharge Permit System. Any point source discharges to state waters without a permit are subject to civil or criminal enforcement action.

As part of this review, the Division has evaluated the following documents:

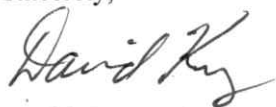
- February 18, 2011 Submittal from ITS, Inc. on behalf of Bio-Microbics, Inc. requesting new technology acceptance for Bio-Microbics FAST® Technology.
- June 13, 2011 Submittal from Bio-Microbics, Inc., providing additional requested information for the new technology review for the FAST® Technology.
- September 14, 2011 Submittal from Bio-Microbics, Inc., providing additional requested information for the new technology review for the FAST® Technology.
- November 23, 2011 Submittal from Bio-Microbics, Inc., providing additional information for the new technology review for the FAST® Technology.
- December 2, 2011 Submittal from Bio-Microbics, Inc., providing additional information for the new technology review for the FAST® Technology.
- Various additional correspondences.

Please direct any further correspondence regarding this acceptance to:

David Kurz, P.E.
Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, CO 80246

If you have any questions or comments, please contact David Kurz at david.kurz@state.co.us or 303-692-3552.

Sincerely,



David Kurz, P.E.
Lead Wastewater Engineer
Engineering Section
Water Quality Control Division

cc: Tim Petz, ITS, Inc.

CDPHE-WQCD-ES